Water Auditing and Retrofitting of Ministry of Awaqf, Islamic Affairs And Holy Places (Jordan)

Prepared by

Water Efficiency and Public Information for Action (WEPIA)

The Academy for Educational Development

Submitted to:
Ministry of Water & Irrigation
Amman - Jordan

March 2001.

Table of Contents

Water Audit and Retrofit for Ministry of Waqf Buildings

Background

Water Efficiency and Public Information for Action (WEPIA) is a project funded by the United States Agency for International Development (USAID) and implemented by the Academy for Educational Development (AED) – Washington D.C., in cooperation with the Ministry of Water and Irrigation. WEPIA, Which is categorized as a social marketing project, has adopted water conservation and water demand management concepts as its basic products.

WEPIA recommends several techniques to achieve the goal of water conservation. One of these techniques, using suitable water saving devices (WSDs) that operate through mixing water with air, allows the consumer to use less water with the same satisfaction. WSDs allow people to use water efficiently and decrease losses. In cooperation with the Jordan Environment Society (JES) as a subcontractor, WEPIA conducted a water audit of the headquarters of the Ministry of Waqf, Islamic Affairs and holy Places (Jordan), at the request of the Ministry.

Objective

The main objective of this study was to conduct a water audit and subsequently retrofit the Ministry of Waqf buildings as a case study, so the efficiency of WSDs could be monitored.

Methodology

1. Conduct a detailed inventory of water outlets at the study location.
2. Identify the Items that could be retrofitted.
3. Estimate the total cost of retrofit.
4. Prepare an economical analysis on the feasibility of using WSDs.

Activities

WEPIA and JES visited Ministry of Waqf and conducted water audits for the two buildings that constitute its headquarters to identify types of bathrooms, flow rates and leaks for different water outlets, and to quantify the amount of water used. Basic information was obtained to prepare the economical and feasibility study of retrofitting the Ministry.

Following the auditing, WEPIA, JES and Al-Rawnaq Company (a local manufacturer of WSDs) held a workshop in the Ministry to train maintenance staff on the use and operation of water auditing and water saving devices. Later, the participants were shown how to install and maintain these devices.

Water Audit for Waqf Buildings

The Ministry is situated in Jabal Al-Hussein, with approximately 450 employees working in two buildings (new and old). Neither of the two buildings has pressurized systems, such as pumps, to supply the water outlets (faucets) directly; rather, the system goes by gravity so the pressure depends upon the water head (buildings height). The pressure ranges between (0.3-1.2) bar. The Ministry's outdoor gardens are too small and could be negligible in the water audit.

The Ministry is aware of using water saving devices (WSDs) as a solution to decrease both water consumption and payment of water bills (but the WSDs were never installed).

The result of the field survey for the two buildings can be summarized as follows:

- The main water outlets needing retrofit are the faucets. There are 35 faucets in all, of which 27 are threaded and 8 are Jordanian manufacture without threads. None of these faucets have leaks.
- No showers.
- No urinals.
- No toilets with gravity tanks.
- After checking the water bills, the study found that the Ministry consumes an average of 800 m^3/year. The cost of one cubic meter for the Ministry is (1.5) JOD, so the total cost of water consumption per year is JOD 1200, which constitutes a modest amount, but which could be further reduced.

Ministry of Waqf building Raw Data

Table (1) shows the raw data from the water audit

Item	Number	Flow rate or Flush	Type
Faucet	35	20 L/min	27 threaded 8 without threads
Showers	0	----------	--------
Toilets	0	----------	Gravity tank
Urinals	0	----------	---------

The hydraulic system in these buildings is non-pressurized and depends on the water head from the tank elevation. It ranges from (0.3-1.2) bar.

Figure below shows the aerators installed in Ministry buildings, with flow rates of 6 L/min as recommended in WEPIA Voluntary Code. The price range for a single aerator is (2.5-3.5) JOD.

Fig (1): domed aerator with 6 L/min flow rate

Results

Table (2) Set of variables to calculate water saving

Variable	Values for Ministry of Waqf Buildings
Fb	20 L/min
Fa	6 L/min
P	120 person
C	250 day/year
R	1
T	1 min

Definition

D is the potential water saving in (L/yr)

Fb is the faucet flow rate before retrofit (L/min)

Fa is the faucet flow rate after retrofit (L/min)

P is the population of the target area using the faucets

C is the number of working days during the year

R is the number of uses per person per day

T is the average number of minutes per use

No. of employees that use Ministry bathrooms = 120 persons (which constitute 27% of Ministry employees)

- D = (20 - 6) 250 X 120 X 1 X 1 = 420,000 L/ year = 420 m^3 /year.
- The cost of 1 cubic meter = 1.5 JOD for the Ministry's buildings.
- The amount of money saved = E = 420 X 1.5 = 630 JOD/Year
- Percentage of saving = 420 / 800 X 100 = 52.5 %
- Payback period = I / E = 109 / 630 = 0.173 year = 63 days = 2 months
- ROR= 630 / 109 X 100 = 578 % = Interest rate of return

Table (3): Economical analysis results

Amount of money saved	630 JOD/year
Percentage of saving	52.5 %
Payback period	2 months
ROR	578 %